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IMPORTANT INSECT ENEMIES OF THE  
MONTEREY PINE

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## IMPORTANT INSECT ENEMIES OF THE

### MONTEREY PINE

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The Monterey Pine used in many localities of the southern Pacific Coast region for windbreaks, shade and ornament is a native of California. While it grows naturally in only a few places along the California sea coast from San Francisco south, it stands transplanting well and has been introduced successfully in many parts of the world. Although without honor in its native land as a timber tree, it has been planted as such with great success in Spain, Australia and New Zealand. Foresters tell us that some of the most magnificent planted forests in the whole world are those of Monterey pine in parts of Spain.

Like all other living things, Monterey pine has to grow in spite of its many enemies. From babyhood to old age they prey upon it. Among the most important are various species of insects. Some come from the native pine groves along the California sea coast and others have been introduced unwittingly from other parts of the world.

There are two important enemies of the Monterey pine, which, while not technically true insects, are so closely related in habits that they usually are considered as such. These are the introduced European pine needle mite and the pine red spider whose native country is unknown.

The European pine needle mite, Eriophyes pini (Nalepa), is a very minute, one 150 of an inch long, yellowish, four-legged mite that lives at the bases of the needles, usually beneath the sheath. Its feeding on the needles causes them to fade and fall prematurely in the spring at the end of their first year. Mite infested trees have a thinner crown of paler foliage and the fallen needles have a distinct orange-brown color. Old and young trees of various species of pines are attacked in most parts of California. Infested trees should be sprayed with oil in the spring when the buds are opening and the mites are migrating from the old needles to the new. It is also important to plant uninfested nursery stock.

The Monterey pine red spider, Paratetranychus sp., is a small reddish, eight legged spider or mite, about one 60 of an inch long. When an infestation is heavy so much sap is sucked from the needles that they turn tan or khaki colored. The growth of the tree is retarded and its ornamental value reduced. Various species of pine are attacked in central and southern California. An oil spray, applied in the spring, will control the spider.

The Monterey pine aphid, Essigella californica (Essig), is a slender, green plant louse about 1/16 of an inch long and with long hind legs. It feeds in colonies on the needles in early spring. Considerable sap is sucked from the needles and quantities of sticky honeydew is excreted. This falls on the foliage and on everything beneath the tree. Various species of pines are attacked. Spray with oil and nicotine as soon as noticed.

The pine leaf scale, Chionaspis pinifoliae (Fitch), is a rather elongate, triangular, waxy white or grayish scale, about 1/10 of an inch long. It occurs in rows on the needles of various conifers. Where the infestation is heavy so much sap is sucked from the needles that they turn yellow and sickly looking. The scale appears to do the most damage to young trees growing in the shade along dusty highways and drives. Practically all of the pines and other conifers are attacked. Spraying the foliage with oil and nicotine about May 1 when the young are crawling will control the leaf scale.

The hemlock scale, Aspidiotus pini Comstock, is a blackish, nearly circular scale about 1/40 of an inch in diameter, that also occurs on the needles of pines and other conifers. When the infestation is heavy so much sap is sucked from the needles that small trees may die. Spraying the foliage in the spring when the young are crawling will control the hemlock scale.

The Monterey pine midge, Thecodiplosis piniradiatae (S. & M.), is a small dark brown fly about 1/25 of an inch long and with an orange colored abdomen. The minute, elliptical, salmon-colored eggs are laid underneath the scales of the buds just before they open in February or March; the small orange colored maggots which hatch from the eggs feed on the bases of the young needles causing them to become much shortened and swollen. In some cases most of the needles are affected and the leaf surface is greatly diminished. Many needles may die and the ornamental value of the tree is greatly reduced. Since the maggots live at the bases of the needles and are protected by the needle sheaths control is difficult. An oil spray applied to the foliage about February 1 should kill many of the midges when they attempt to lay their eggs and also the eggs and young maggots.

The Monterey pine needle miner, Argyresthia pilatella Braun, is a small greenish caterpillar about 1/6 of an inch long. The head, thorax and tail plates are dark brown. The moth which produces this caterpillar is silvery gray in color and has a wingspread of about 1/4 of an inch. The caterpillar injures the tree by mining the needles from the base, hollowing them out and causing them to turn yellow and brown. Bundles of mined needles often fall to the ground. The species attacks pine in central California. Oil and nicotine applied to the foliage about May 1 when the eggs are laid should control the needle miner.

The Monterey pine needle weevil, Scythropus ferrugineus Casey, is a mottled, rusty red, rather flattened and short beaked beetle about 1/5 of an inch long. It injures pine trees by gnawing the edges of the needles so that they become saw toothed. The white, weevil-like grubs which the weevil produces live in the soil beneath the trees and may feed on the roots. Monterey and other pines are attacked in California and Oregon. Usually the weevils are not common enough to do much damage. If control is necessary the foliage should be sprayed with arsenate of lead about February 1.



The Monterey pine chafer, Dichelonyx decolorata Fall, is a rather blackish beetle with black striped, straw colored wing covers. The length is about  $\frac{1}{2}$  of an inch. The beetle injures the tree by gnawing long sections from the sides of the needles. The white, curled, grub-like young live in the soil and probably feed on the roots. Various species of pine are attacked in central California. If control is necessary the foliage should be sprayed with arsenate of lead about February 1.

The Pacific ten-lined June beetle, Polyphylla crinata Lec., is a large, stout, brown beetle about 1 to  $1\frac{1}{2}$  inches long. The back of the head is marked by two yellowish or white stripes, the thorax by three, and each wing cover by four long and one short stripe. The June beetle sometimes causes considerable alarm by its habit of swarming on the foliage and feeding on the needles but usually not much damage is done. Considerable more damage may be caused by the large grub-like young which live in the soil and feed on the roots of the pine and various other trees and shrubs. These young live in the soil for about three years before transforming to the beetle stage. The June beetle usually is not common enough to do much damage. Deep cultivation in the fall will kill the young and clean cultivation under and around the trees will prevent the laying of eggs.

The Monterey pine tiger moth, Halisidota consobrina Stretch, is a large moth with a body length of  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch and a wing spread of  $1\frac{1}{4}$  to 2 inches. The body is white to light brown in color. The forewings are dark brown marked with a series of small to large silver spots, the hind wings are white usually with a few spots of brown along the front edge. The moths lay masses of light green, dome-shaped eggs on the needles of the pine. These hatch during the spring and early summer into dirty white caterpillars marked by dark tubercles which bear long black and white hairs. The masses of young caterpillars web together many needles which they gnaw and feed upon. Branches and sometimes the entire tree is stripped of its foliage. As the caterpillars grow older they separate and crawl to new foliage. When full grown the caterpillars are  $1\frac{1}{4}$  inches long, gray in color, and with tufts of black and yellow hairs protruding from the surface. Pine is attacked in central California. The same or a closely related species feeds on the foliage of many conifers throughout the Pacific States. Pruning out and burning the webs of small caterpillars during the late summer is the best control.

The Monterey pine looper, Neptia nigrovenaria Pack., is the light green, smooth caterpillar of a mottled gray moth with a wing spread of about  $1\frac{1}{2}$  inches. It partially destroys the ornamental value of young Monterey pines in central California by tying the young needles at the tips of the branches together and feeding on them. Since the most of the feeding is done when the new growth is starting, infested trees look rather ragged in the springtime. Control is obtained by spraying the foliage with arsenate of lead as soon as the caterpillars are noticed.

The orange tortrix, or skin worm, moth Eulia citrana Fern., is fawn or grayish with darker mottlings on the forewings and a wing spread of  $\frac{1}{2}$  to  $\frac{3}{4}$  of an inch. It lays yellowish disc shaped eggs on the foliage which hatch into greenish caterpillars with brownish heads and brownish plates on

the thorax. These caterpillars web together the needles to form small nests in which they feed. As they become older they become darker green in color and marked with light colored tubercles. A tree infested with a number of nests of dead and partially dead needles loses much of its ornamental value. There are two generations of moths each year. Monterey pine and numerous other plants are attacked in California. Arsenate of lead sprayed on the foliage about April 1 will control the skin worm.

The Monterey pine sawfly, Itycorsia sp., is an unnamed native species of defoliator that so far has caused serious damage to the pine only in the natural forests at Pacific Grove, California. The female sawfly is a mottled brown, dark and tan, wasp-like insect about  $2/5$  of an inch long and with a wing spread of about  $3/5$  of an inch. The male is slightly smaller than the female and black with a black abdomen, or with the last three segments red. Sometime between the middle of April and the first of August the female lays the light yellow to green, canoe shaped eggs on the needles. The eggs hatch in from 10 to 21 days and the reddish brown or green caterpillar-like young feed upon the needles gnawing irregular trails through the foliage. These trails are marked by web-entangled pellets of brown droppings and bits of partially gnawed needles. In about 20 to 30 days the young become full grown and drop to the ground where they wriggle down into the soil for an inch or more and rest until the next spring. In the spring they transform to adult wasps, or sawflies, and fly to the pine foliage, mate and lay eggs to start another generation. The gnawing of the foliage gives the tree a ragged and dilapidated appearance. Sometimes so many needles are destroyed that the tree dies. The sawfly is so destructive, especially to young trees, that care should be taken to see that it is not spread from the native groves with potted or balled young pine. Spraying the foliage about June 1 with arsenate of lead should give control.

The devastating grasshopper, Melanoplus devastator Scudder, is a small yellowish brown species about 1 inch long. There are some black spots on the back, wing covers and legs and some blue on the hind legs. Usually we do not expect grasshoppers to attack pine trees. Sometimes, however, when small groves are surrounded by grass lands, the hoppers will swarm into the groves and completely strip trees up to 15 feet in height of their leaves and twig bark. Some years numerous trees in central California are killed in this way by grasshoppers. Since grasshoppers can migrate for considerable distances their control is a community problem. Cultivation of the soil where the eggs are laid will destroy the most of them. About all that the tree owner can do when trees are threatened by grasshoppers is to cover them with cloth netting.

The Monterey pine bark aphid, Pineus borneri An., sometimes in the spring heavily marks the bark of twigs, branches and even the trunks of small trees with small patches of white wooly wax. Underneath each wooly patch is a small, rusty red, sucking insect about  $1/25$  of an inch long and often a mass of small light colored eggs. Sometimes so much sap is sucked from the bark that the infested parts die and turn yellow. The bark aphid occurs on several species of pine in various parts of California. Spraying the bark with oil and nicotine as soon as the white wooly masses are noticed in the spring will control the bark aphid.



The spittle bug, Aphrophora permutata Uhler, often attracts attention in the spring by its habits of sucking the sap from the twigs and excreting masses of froth-like material. Where the infestation is heavy growth is retarded and some parts may be so injured that numerous needles drop. The masses of spittle-like froth injure the ornamental value of the tree. In each mass of froth is found an odd looking, reddish, hopper-like insect. Handpicking the insects from the frothy masses is probably the best method of control. A strong stream of water will dislodge them.

The Monterey pine tip moth, Rhyacionia pasadenana (Kearf), caterpillar injures the tree by boring through the bud of the terminal shoot and down into the stem. This causes a deformation or the death of the shoot. Usually the bud does not develop. Often there is an evudation of resin but no pitch nodule is formed. A heavy infestation causes considerable stunting of growth and reduction in the ornamental value of the tree. The pine tip moth is reddish silvery-gray with a wing spread of about  $3/4$  of an inch. It lays its eggs on the buds in the spring. Spraying the buds with oil and nicotine about the time that the eggs are laid should give control.

The Monterey pine shoot moth, Exoteleia burkei Keif., caterpillar mines the center of the developing shoots of the pine in the early spring causing them to wither, droop, die and become brown. Where the infestation is heavy most of the shoots are killed, the tree is dwarfed and its ornamental value is destroyed. The work differs from that of the tip moth in that the bud usually starts to develop and may grow for 6 or 7 inches before it dies. Buds bored by tip moth caterpillars usually are hollowed out while those killed by shoot moth caterpillars are withered. The shoot moth is grayish brown with wings marked by three whitish bands edged with black tufts and bright orange. The wing spread is  $1/3$  to  $2/5$  of an inch. The caterpillars are brown with black heads and tail plate. The eggs that hatch into caterpillars are laid in May and June, probably at the bases of the buds for the next year. Spraying the foliage with oil and nicotine about June 1 should kill the eggs and young caterpillars and give control.

The Monterey pine scale, Physokermes insignicola (Craw), injures the tree by sucking the sap from the twigs and excreting over the foliage and everything beneath the tree a sticky honeydew. The sucking of the sap causes a shortening of the twigs and a bushy growth of foliage. The excreting of the honeydew causes a growth of black sooty fungus which gives the whole a dirty unattractive appearance. The fullgrown female scales are  $1/5$  of an inch in diameter, globular and shiny reddish-brown to black. Usually they are found attached to the twigs between the bases of the needles. The needles are spotted with the yellowish-brown, oblong-oval male cocoons and the younger stages. The males are delicate insects  $1/12$  of an inch long, mahogany red, with slender legs, two long, reddish-veined wings, and some long filaments projecting backward from the tip of the body. The eggs are laid beneath the body of the female about the middle of April and the young soon hatch and crawl on or near the base of a developing needle. The young that settle on the needles become males and those that settle on the bark of the twigs become females. Spraying the foliage with oil and nicotine about May 15 when the young are crawling to the developing twigs will give control.

The irregular pine scale, Toumeyella pinicola Ferris injures the trees in about the same way that the Monterey pine scale injures them. In central California it is the more common of the two. The fullgrown female is more or less spherical, wrinkled, grayish to brown, and is usually crowded in between the bases of the needles. The males are similar to those of the Monterey pine scale but smaller. The young are born about the middle of April and soon crawl to the growing twigs where those that are to grow into females settle on the bark and those that are to grow into males settle on the needles. Spraying the foliage with oil and nicotine about May 15 will kill the young and give control.

The Monterey pine twig beetle, Pityophthorus carmeli Sw. is a small black rather cylindrical beetle about  $3/32$  of an inch long. It injures the tree by mining the inner bark and wood of the living twigs. Numerous twigs are cut off and fall to the ground and many others are killed on the tree. The yellowing and reddening of the foliage of the dying twigs more or less destroys the ornamental value of the tree. The inner bark of the trunks of small trees may also be attacked and so injured that the trees die. The beetles develop their broods in the inner bark of the trunks and larger branches and in the wood of the twigs. The grubs are white with brown heads and legless. Various species of pines are attacked and sometimes spruce, fir and true cedars have their twigs killed by beetles who in so attacking abnormal hosts doom their own offspring to untimely deaths. Since the twig beetles breed in the inner bark and dead twigs, branches, and tops of pines, all such should be cut and burned as soon as noticed. Slash from live trees cut for any reason should receive the same treatment. So far no sprays nor dusts have been developed that will control the twig beetle.

There are three pine engraver beetles that mine the inner bark of the tops, branches and trunks of the Monterey pine and often kill parts or the entire tree. These are the five-spined engraver, Ips confusus (Lec.), the California pine engraver, Ips plastographus (Lec.), and the Monterey pine engraver, Ips radiatae Hopk. All of these are small brownish to black, rather cylindrical beetles about  $3/16$  of an inch long. The tips of the wing covers are armed with tooth-like projections. The five-spined engraver has five teeth on each wing cover, the California pine engraver has four and the Monterey pine engraver three, one of which is much longer than the other two. All attack and mine the inner bark of the tops, larger branches and trunks of pines, usually killing the parts attacked. The trees are attacked and killed so that the young may develop in the dying inner bark. These young are legless white grubs with brown heads. Under favorable conditions there may be as many as five generations a year. Since the beetles develop in dying trees or dying parts of living trees all such should be cut and burned before the broods develop and emerge to attack other trees. Trees cut for wood or in clearing will develop swarms of engraver beetles unless they are treated by barking or burning.

The red turpentine beetle, Dendroctonus valens Lec., is a serious enemy of the Monterey pine in central California because of its habit of mining the bark of the base and the roots of living trees. The mines cause pitchy wounds and kill small areas of the inner bark. If a number of beetles attack the same tree the trunk may be completely girdled and the tree dies.



An attack by the turpentine beetle is indicated on the outer bark by the presence of small masses of resin mixed with sawdust-like borings. The beetle is stout, cylindrical, light to dark red in color and about  $1/5$  to  $2/5$  of an inch in length. The grubs are cylindrical, white, legless and have a reddish head and two reddish plates on the tail, each armed with three stout spines. Trees may be attacked almost any time during the year. Fresh lumber or wood or injuries to living trees will attract beetles from a considerable distance. Control consists of rooting out and burning the infested dying and dead trees to prevent the development of the infesting broods and the injecting of some fumigant such as ethylene dichloride in the mines under the bark of recently attacked trees.

The sequoia pitch moth, Vespamima sequoiae (Hy. Edw.), sometimes causes the trunks of pine to look very unsightly from the formation of large somewhat circular masses of grayish resin on the bark. The resin is extruded from short broad mines in the inner bark made by the caterpillars of the moth. When several caterpillars attack a branch or the trunk of a small tree the mines may girdle and kill the parts attacked. Usually, however, the greatest damage done is the unsightly appearance of the resin masses on the bark of the trunk. The female sequoia pitch moth has a black or blue-black body with the last three segments and the legs marked with yellow. The wings are clear like those of a wasp and margined with black. The length of the body is about  $2/3$  of an inch and the wing spread about 1 to  $1\frac{1}{4}$  inches. The male moth is slightly smaller than the female and has the last four segments banded with yellow. The full grown caterpillars are from  $3/4$  to  $1\frac{1}{2}$  inches long, dirty-white or yellowish in color, with brownish heads and three pairs of true legs and five pairs of false ones. Scraping off the resin masses and crushing the caterpillars beneath them is the best known method of control.

The Monterey pine weevil, Pissodes radiatae Hopk., grubs sometimes kill small trees and the tops of large ones by their habit of mining the inner bark. The weevils themselves injure the trees by feeding on the inner bark of the new shoots. This feeding causes pitch spots to form on the bark and the shoots to lop over. Weevil grub mining can be told from that of bark beetles because there are no open mines in the inner bark, a number of mines usually start from a single spot, and the completed mine ends in a shredded wood covered cocoon or cell in the outer wood. The weevil is a long beaked beetle about  $1/5$  to  $1/3$  of an inch long, brown, with the wing covers marked by small yellow spots in front and a band of white scales behind. The grubs are yellowish white, cylindrical, legless, with light-brown heads. Control consists of cutting out and burning the infested tops and trees during the winter.

From the standpoint of the prevention of insect attack the Monterey pine, like all trees, should be kept in a vigorous growing condition by the proper care. Just what the proper care is is not so easy to say. We do know, however, that sanitation is important. Dying and dead trees and dying and dead branches on living trees should be cut and burned. When trees are felled in grading or in clearing for building sites the tops, branches and roots



should be burned and the trunks barked if they are to be used for fuel. An untreated woodpile has often been the indirect cause of the death of fine trees on a choice building site.

Since most of the insect enemies of the Monterey pine are able to travel for considerable distances their control is more or less of a community problem. The individual owner, however, can protect his trees from many insects by using the proper control at the right time.